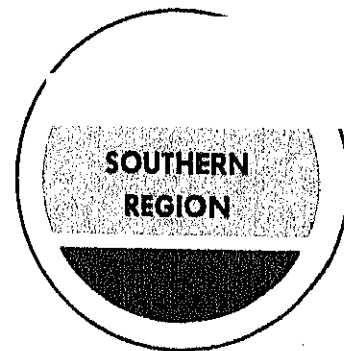


COOPERATIVE SWEET SORGHUM VARIETY TESTS FOR SUGAR DURING 1970 IN FOUR SOUTHERN STATES

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COOPERATIVE SWEET SORGHUM VARIETY TESTS FOR SUGAR DURING 1970 IN FOUR SOUTHERN STATES

By Kelly C. Freeman, Dempsey M. Broadhead, Otto H. Coleman, and Natale Zummo¹

SUMMARY

Fourteen varieties of sweet sorghum were evaluated for potential sugar production at one or more locations. 'Mer. 68-7' and 'Mer. 68-10' produced more sugar per ton of stalks than 'Rio' (standard) in seven of nine and eight of eleven tests respectively. 'Mer. 64-3' ('Roma') exceeded 'Rio' by 44 percent in pounds of sugar per acre at Weslaco, Tex. Drought of various degrees and periods of duration extended the development period (planting to harvest) for some varieties.

INTRODUCTION

Experimental plots designed to test eleven sweet sorghum varieties for sugar were planted in four southern states—Georgia, Louisiana, Mississippi and Texas. These tests were conducted in cooperation with several agencies and the U. S. Sugar Crops Field Station, Meridian, Miss. (A complete list of cooperating stations and personnel appears at the front of this report).

TEST VARIETIES AND METHODS

All tests included varieties 'Rio' and 'Mer. 68-10' and all except Weslaco, Tex. included 'Mer. 67-1' and 'Mer. 67-15'. 'Mer. 64-7', 'Mer. 67-14', and 'Mer. 68-7' were included in tests in Georgia, Louisiana, and Mississippi. The varieties 'Mer. 56-15', 'Mer. 63-3', 'Mer. 66-1' and 'Brawley' were included at Lubbock, Tex. and 'Mer. 64-3' ('Roma'), 'Mer. 65-2' and 'Mer. 67-17' were included in the test at Weslaco, Tex.

A randomized complete block design with five

replications of each variety was used. Each plot included three rows, with an area of 1/200-acre. The seed in most tests was planted with hill-drop planters, and the plants were thinned to three or four per hill. In remaining tests the seed was drilled with a spout drill and the plants were thinned to 6- to 8-inch spacing. The plots were cultivated with conventional tractor cultivators. All sorghum was harvested when the seed was ripe.

Ten to thirty stalks from each plot were milled to obtain juice for Brix and sucrose analysis. At Meridian, Miss.; Cairo, Ga.; and Houma, La. the stalks were harvested and milled, and the juice analyzed the same day. At Weslaco, Tex., the stalks were milled immediately after harvest, but the juice was quick-frozen and analyzed later.

The stalk samples from Baton Rouge and Bossier City, La. and from Lorman, Poplarville, State College, and Stoneville, Miss. were milled within 24 hours after harvest. The juice from the stalk samples at Lubbock, Tex. was treated with mercuric chloride and shipped to Meridian for analysis.

RESULTS AND DISCUSSION

Table 1 shows yield of stripped stalks in percentage of 'Rio'. Data for 'Rio', the standard variety, is in tons of stalks per acre. 'Rio' averaged 14.7 tons of stalks per acre and ranged from 11.0 to 21.0 tons at Poplarville and Meridian, Miss., respectively. 'Mer. 64-7' and 'Mer. 67-15' were 116 and 104 percent of 'Rio' in stalk yield. All other varieties, except 'Mer. 64-3' ('Roma') 'Mer. 65-2' and 'Mer. 67-17' at Weslaco, Tex. were lower in stalk yield than 'Rio'. 'Mer. 64' ('Roma'), 'Mer. 65-2' and 'Mer. 67-17' at Weslaco, Tex. were 151, 135 and 116 percent of 'Rio' in yield of stalks per acre.

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Table 2 shows degrees Brix of extracted juice of varieties, in percentage of 'Rio' Brix. 'Rio' juice averaged 19.4 degrees Brix. The 14.9 Brix of 'Rio' at Houma, La. was unusually low. 'Mer. 68-10' had a higher Brix than 'Rio' at all locations except Poplarville, Miss. 'Brawley' Brix was 112 percent of 'Rio' at Lubbock, Tex. 'Mer. 64-3' ('Roma') and 'Mer. 65-2', which are varieties exhibiting potential for commercial culture, had Brix readings of 98 and 94 percent of 'Rio'.

Sucrose as a percentage of 'Rio' yield is presented in table 3. 'Mer. 67-1', 'Mer. 67-15', 'Mer. 68-7' and 'Mer. 68-10' were higher in sucrose than 'Rio'. At Lubbock, Tex., 'Mer. 56-15', 'Mer. 66-1' and 'Brawley' were higher than 'Rio' in sucrose.

Table 4 lists the apparent purity of sucrose as a percentage of 'Rio' purity. The mean apparent purity for 'Rio' was 74.2 percent. The purity of 'Rio' at Cairo, Ga. and Stoneville, Miss. was unusually low, which is reflected in a higher-than-expected mean percentage for 'Mer. 64-7', 'Mer. 67-1', 'Mer. 67-14', 'Mer. 67-15', 'Mer. 68-7' and 'Mer. 68-10'.

Calculated sugar per ton of stalks of the varieties as a percentage of 'Rio' sugar yield is shown in table 5. The poor performance of 'Rio' at Cairo, Ga. resulted in a higher mean percentage for 'Mer. 64-7', 'Mer. 67-1', 'Mer. 67-14', 'Mer. 67-15', 'Mer. 68-7' and 'Mer. 68-10' than expected.

Table 6 shows calculated sugar per acre as a percentage of 'Rio' yield per acre. The most significant item in this year's test results was the yield of 'Mer. 64-3' ('Roma') (144% of 'Rio')

at Weslaco, Tex. Weather conditions for early development of plants was extremely poor at Cairo, Ga. Improved later weather conditions favored later maturing varieties.

Table 7 shows the number of days from planting to harvest. 'Rio' averaged 126 days from planting to harvest and ranged from 98 at Bossier City, La. to 155 at Baton Rouge, La. The number of days from planting to harvest is related to rainfall during the growing season. The conditions at Meridian, Miss. (one irrigation) and Weslaco, Tex. (three irrigations) favored uninhibited development of the plants, whereas in other locations drought of various degrees and duration extended the development period for some varieties.

Table 8 contains data on diseases of economic importance on fourteen sweet sorghum sugar varieties. Diseases were rated on a scale of 0 to 4, with four representing destruction of 25% or more of leaf tissue. 'Mer. 67-14' was susceptible to anthracnose at Meridian, Miss. Every variety had gray leaf spot infection at one or more locations, except at Lubbock, Tex., where no disease was of economic importance. Symptoms of gray leaf spot appeared on the leaves late in the growing season, and though extensive in destruction of leaf tissue, the disease did not greatly reduce the quality of the stalk juice.

Rust ratings of 3 or above were recorded on 'Mer. 64-7' and 'Mer. 68-7' at Houma, La. and on 'Mer. 67-17' and 'Mer. 68-10' at Weslaco, Tex. Zonate leaf spot was very conspicuous on 'Rio', 'Mer. 67-1', 'Mer. 67-14', 'Mer. 67-15' and 'Mer. 68-7' in the three Louisiana tests.

TABLE 1.—Yield of stripped stalks per acre as percent of 'Rio'

Location	Standard	Test variety												
	'Rio' (T/A)	'Mer. 64-7'	'Mer. 67-1'	'Mer. 67-14'	'Mer. 67-15'	'Mer. 68-7'	'Mer. 68-10'	'Mer. 56-15'	'Mer. 63-3'	'Mer. 64-3' (Roma')	'Mer. 65-2'	'Mer. 66-1'	'Mer. 67-17'	
GEORGIA:														
Cairo	12.5	118	70	146	119	86	78	---	---	---	---	---	---	
LOUISIANA:														
Baton Rouge	13.8	127	67	117	110	93	78	---	---	---	---	---	---	
Bossier City	13.2	138	58	105	101	77	82	---	---	---	---	---	---	
Houma	18.4	93	62	106	94	70	72	---	---	---	---	---	---	
Mean	15.1	119	62	109	102	80	77	---	---	---	---	---	---	
MISSISSIPPI:														
Lorman	16.4	95	59	95	88	74	77	---	---	---	---	---	---	
Meridian	21.0	101	65	112	100	76	82	---	---	---	---	---	---	
Poplarville	11.0	114	38	125	130	69	60	---	---	---	---	---	---	
State College	11.7	126	40	122	104	69	72	---	---	---	---	---	---	
Stoneville	13.6	125	46	117	101	81	78	---	---	---	---	---	---	
Mean	14.7	112	50	114	105	74	74	---	---	---	---	---	---	
TEXAS:														
Lubbock	16.8	---	59	---	90	---	71	70	57	74	---	74	---	
Weslaco	16.2	---	---	---	---	---	89	---	---	151	135	---	116	
Mean	16.5	---	---	---	---	---	80	---	---	---	---	---	---	
Mean of Means	14.7	116	60	89	104	80	77	70	57	74	135	74	116	

TABLE 2.—*Soluble solids as percent of 'Rio'*

Location	Standard	Test variety												
	'Rio' (degrees Brix)	'Mer. 64-7'	'Mer. 67-1'	'Mer. 67-14'	'Mer. 67-15'	'Mer. 68-7'	'Mer. 68-10'	'Mer. 56-15'	'Mer. 63-3'	'Mer. (Roma')	'Mer. 65-2'	'Mer. 66-1'	'Mer. 67-17'	
GEORGIA:														
Cairo	18.6	93	96	94	103	108	112	—	—	—	—	—	—	
LOUISIANA:														
Baton Rouge	20.8	96	101	95	104	106	110	—	—	—	—	—	—	
Bossier City	21.1	88	95	87	102	108	111	—	—	—	—	—	—	
Houma	14.9	105	90	95	107	96	106	—	—	—	—	—	—	
Mean	18.9	96	95	92	104	103	109	—	—	—	—	—	—	
MISSISSIPPI:														
Lorman	20.4	97	98	81	96	105	105	—	—	—	—	—	—	
Meridian	18.8	86	99	99	98	106	101	—	—	—	—	—	—	
Poplarville	19.7	97	90	101	105	91	99	—	—	—	—	—	—	
State College	20.1	94	102	96	101	107	102	—	—	—	—	—	—	
Stoneville	21.2	81	95	90	97	105	104	—	—	—	—	—	—	
Mean	20.0	91	97	93	99	103	102	—	—	—	—	—	—	
TEXAS:														
Lubbock	21.1	—	96	—	98	—	108	100	112	93	—	104	—	
Weslaco	19.0	—	—	—	—	—	104	—	—	98	94	—	90	
Mean	20.0	—	—	—	—	—	106	—	—	—	—	—	—	
Mean of Means	19.4	93	96	93	101	105	107	100	112	93	94	104	90	

TABLE 3.—*Juice sucrose as percent of 'Rio'*

Location	Standard	Test variety												
	'Rio' (percent) sucrose	'Mer. 64-7'	'Mer. 67-1'	'Mer. 67-14'	'Mer. 67-15'	'Mer. 68-7'	'Mer. 68-10'	'Mer. 56-15'	'Mer. 63-3'	'Mer. 64-3' ('Roma')	'Mer. 65-2'	'Mer. 66-1'	'Mer. 67-17'	
GEORGIA:														
Cairo	12.4	108	114	106	125	123	121	---	---	---	---	---	---	
LOUISIANA:														
Baton Rouge	16.0	85	108	95	104	109	110	---	---	---	---	---	---	
Bossier City	16.5	79	84	78	99	107	104	---	---	---	---	---	---	
Houma	11.4	102	85	89	106	96	106	---	---	---	---	---	---	
Mean	14.6	89	92	87	103	104	107	---	---	---	---	---	---	
MISSISSIPPI:														
Lorman	16.0	95	101	79	94	110	106	---	---	---	---	---	---	
Meridian	14.5	81	97	101	98	106	97	---	---	---	---	---	---	
Poplarville	15.4	94	93	98	100	89	94	---	---	---	---	---	---	
State College	15.8	92	111	99	101	113	110	---	---	---	---	---	---	
Stoneville	15.4	66	101	87	92	101	103	---	---	---	---	---	---	
Mean	15.4	86	101	93	97	104	102	---	---	---	---	---	---	
TEXAS:														
Lubbock	17.0	---	100	---	96	---	102	102	109	95	---	107	---	
Weslaco	13.9	---	---	---	---	---	107	---	---	97	90	---	82	
Mean	15.4	---	---	---	---	---	104	---	---	---	---	---	---	
Mean of Means	14.4	94	102	95	105	110	109	102	109	95	97	90	82	

TABLE 5.—*Calculated sugar per ton as percent of 'Rio'*

Location	Standard	Test variety												
	'Rio' (lb/T)	'Mer. 64-7'	'Mer. 67-1'	'Mer. 67-14'	'Mer. 67-15'	'Mer. 68-7'	'Mer. 68-10'	'Mer. 68-15'	'Mer. 'Brawley' 63-3'	'Mer. 64-3' ('Roma')	'Mer. 65-2'	'Mer. 66-1'	'Mer. 67-17'	
GEORGIA:														
Cairo	155.2	119	127	116	141	133	128	—	—	—	—	—	—	
LOUISIANA:														
Baton Rouge	220.3	79	112	95	103	111	110	—	—	—	—	—	—	
Bossier City	227.7	73	78	73	98	108	101	—	—	—	—	—	—	
Houma	155.9	100	83	87	106	97	106	—	—	—	—	—	—	
Mean	201.3	84	91	85	102	105	106	—	—	—	—	—	—	
MISSISSIPPI:														
Lorman	222.6	94	102	78	92	113	106	—	—	—	—	—	—	
Meridian	199.6	79	95	103	97	107	94	—	—	—	—	—	—	
Poplarville	213.5	91	95	97	97	88	91	—	—	—	—	—	—	
State College	219.8	91	115	101	100	116	115	—	—	—	—	—	—	
Stoneville	195.1	58	110	89	93	104	107	—	—	—	—	—	—	
Mean	210.1	83	103	94	96	106	103	—	—	—	—	—	—	
TEXAS:														
Lubbock	239.6	—	102	—	95	—	100	103	107	97	—	109	—	
Weslaco	186.0	—	—	—	—	—	109	—	—	96	87	—	76	
Mean	212.8	—	—	—	—	—	104	—	—	—	—	—	—	
Mean of Means	194.8	95	106	98	108	115	110	103	107	97	96	87	76	

TABLE 6.—*Calculated sugar per acre as percent of 'Rio'*

Location	Standard	Test variety												
	'Rio' (lb/A)	'Mer. 64-7'	'Mer. 67-1'	'Mer. 67-14'	'Mer. 67-15'	'Mer. 68-7'	'Mer. 68-10'	'Mer. 56-15'	'Mer. 63-3'	'Mer. 64-3' (Roma')	'Mer. 65-2'	'Mer. 66-1'	'Mer. 67-17'	
GEORGIA:														
Cairo	1940	141	89	170	168	114	99							
LOUISIANA:														
Baton Rouge	3040	100	75	111	114	103	85							
Bossier City	3006	101	45	76	99	83	83							
Houma	2868	93	52	92	100	67	77							
Mean	2971	98	57	93	104	84	82							
MISSISSIPPI:														
Lorman	3651	89	60	75	82	83	81							
Meridian	4193	79	62	115	97	81	77							
Poplarville	2348	104	36	121	127	61	55							
State College	2572	115	46	124	104	80	82							
Stoneville	2654	73	50	105	94	84	84							
Mean	3084	92	51	108	101	78	76							
TEXAS:														
Lubbock	4025		60		86		71	72	61	71		80		
Weslaco	3013						97			144	117		89	
Mean	3519						84							
Mean of Means	2878	110	64	124	115	92	86	72	61	71	144	117	80	
													89	

TABLE 7.—Days from planting to harvest

Location	Standard	Test variety												
	'Rio'	'Mer. 64-7'	'Mer. 67-1'	'Mer. 67-14'	'Mer. 67-15'	'Mer. 68-7'	'Mer. 68-10'	'Mer. 56-15'	'Mer. 'Brawley' 63-3'	'Mer. 64-3' (Roma')	'Mer. 65-2'	'Mer. 66-1'	'Mer. 67-17'	
GEORGIA:														
Cairo	115	142	115	142	142	115	115							
LOUISIANA:														
Baton Rouge	155	155	124	155	155	124	124							
Bossier City	98	132	98	132	132	98	98							
Houma	140	153	140	140	140	140	140							
Mean	131	147	121	142	142	121	121							
MISSISSIPPI:														
Lorman	119	153	119	153	153	119	119							
Meridian	122	127	115	127	122	115	115							
Poplarville	124	167	124	167	167	124	124							
State College	153	153	125	153	153	125	125							
Stoneville	134	134	134	134	134	134	134							
Mean	130	147	123	147	146	123	123							
TEXAS:														
Lubbock	140		140		140		140	140	140			140		
Weslaco	112						93			112	106		106	
Mean	126						116							
Mean of Means	126	145	125	144	142	120	119	140	140	112	106	140	106	

TABLE 8.—Diseases rated 3 or 4 on 14 sweet sorghum sugar varieties^{1,2}

Standard														1														2																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															
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¹ A = Anthracnose
 BS = Bacterial stripe
 GLS = Gray leaf spot
 INS = Insecticide injury
 R = Rust
 RS = Rough spot
 ZLS = Zonate leaf spot

² DISEASE GUIDE

- 1 = Disease present
 2 = Disease quite noticeable, distributed over most or all of the area, but too slight to be considered of economic importance.
 3 = Disease probably covers enough to cause reduction of quality or yield. Estimated leaf area destroyed probably up to 25 percent.
 4 = Disease obviously responsible for some reduction in yield or quality. Leaf area destroyed estimated above 25 percent.